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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/738,398	12/17/2003	Yi Sun Chung	CU-3492 RJS	7995
26530	7590	04/27/2005	EXAMINER	
LADAS & PARRY LLP 224 SOUTH MICHIGAN AVENUE SUITE 1200 CHICAGO, IL 60604			WILSON, CHRISTIAN D	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 04/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/738,398

Applicant(s)

CHUNG, YI SUN

Examiner

Christian Wilson

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 01292004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: search history.

## DETAILED ACTION

### *Claim Objections*

1. Claim 1 is objected to because of the following informalities: in line 4, the symbol □ appears before the word “device”. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 5, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coolbaugh *et al.*

Coolbaugh *et al.* (US 2004/0112325) teaches a method of forming a MIM capacitor comprising the steps of forming a via 14 at a first insulating layer 12, forming a first barrier layer 16 at a surface of the first insulating layer including the via, forming a metal layer 18 on the first insulating layer, forming a capacitor lower electrode layer 60 after forming a second barrier layer 26 and a third barrier layer 50 on the metal layer, forming a dielectric layer by oxidizing the capacitor lower electrode layer [0053], forming a capacitor upper electrode layer 66 on the dielectric layer, and patterning the capacitor upper electrode layer, dielectric layer, and lower electrode layer [Figure 5D]. Coolbaugh *et al.* does not explicitly discuss opening the via to expose a lower metal wire, but it would have been obvious to one of ordinary skill in the art to use the via to expose a lower metal wire since Coolbaugh *et al.* teaches the underlying substrate

Art Unit: 2891

can contain an underlying wiring layer [0042] and the resulting damascene structure would provide small feature sizes [0006].

Regarding claim 2, Coolbaugh *et al.* further teaches a metal capable of forming a layer with a high dielectric constant [0053].

Regarding claim 5, Coolbaugh *et al.* further teaches a oxidation thickness of 50 – 5000 Å [0052].

Regarding claim 9, Coolbaugh *et al.* further teaches an upper electrode layer formed of tantalum nitride (TaN) [0058].

Regarding claim 10, Coolbaugh *et al.* further teaches a continuous process method but does not discuss forming the multiple layers *in situ*. It would have been obvious to one of ordinary skill in the art to form these layers *in situ* since it is well known that continuous *in situ* processing prevents the unwanted deposition of outside contaminant which would reduce the process yield.

4. Claims 3, 4, and 6 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coolbaugh *et al.* as applied to claim 1 above, and further in view of Narwankar *et al.*

Coolbaugh *et al.* does not discuss depositing an amorphous metal layer by sputtering. Narwankar *et al.* (US 6,677,254) teaches a sputtering process to deposit an amorphous TaN layer [Table 2]. It would have been obvious to one of ordinary skill in the art to use the deposition process of Narwankar *et al.* in the method of Coolbaugh *et al.* since this provides a TaN layer with a range of stoichiometric compositions and improved resistivity.

Regarding claim 4, Coolbaugh *et al.* further teaches a metal layer of TaN [0052].

Regarding claims 6 – 8, Coolbaugh *et al.* teaches an anodic oxidation process to form the oxide layer, but does not discuss the particular process parameters. Narwankar *et al.* teaches an oxygen plasma treatment process with a power of 1400 – 4500 W [column 8, line 57; column 11,

Art Unit: 2891

lines 10-20]. It would have been obvious to one of ordinary skill in the art to use the oxidation process of Narwankar *et al.* in the method of Coolbaugh *et al.* since this method provides a means of optimizing the yield while reducing the thermal budget.

### ***Conclusion***

5. A copy of the search history (EAST and STN) is enclosed.
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886. The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Christian Wilson, Ph.D.  
Primary Examiner  
Art Unit 2891

CDW